WILDLIFE REVIEW

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Washington, D. C. No. 14 May, 1938

Conservation: Birds in Europe

Storer, Tracy I. Relations between man and birds in western Europe, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 40(2), March-April 1938, pp. 63-70, figs. 24-26.

Human influences on birds through alteration of habitat, legislation, management, and utilization, including sale in markets (prices quoted). Inspection of the European situation encourages the author to believe that American "bird populations may be expected to persist, with but limited modification, for many generations."

Conservation: Esthetics

Leopold, Aldo. Conservation esthetic, Bird-Lore (1775 Broadway, New York, N. Y., 30 cents a copy), 40(2), March-April 1938, pp. 101-109, 4 photos.

Something all should read, although it may be that each will see in it chiefly that which agrees with his own ideas of conservation. "Recreation has become a self-destructive process of seeking but never quite finding; a major frustration of mechanized society." "as mass use increases it tends to push the whole gamut of conservation techniques toward the artificial end." "Artificialized management x x x has paid dividends to one citizen out of capital stock belonging to all." "the fresh-air and change-of-scene component is like the photographic trophy--it withstands mass-use without damage." "Perception x x x nature study x x x entails no consumption and no dilution of any resource." "The only true development in American recreational resources is the development of the perceptive faculty in Americans." "The disquieting thing in the modern picture is the trophy-hunter who never grows up, in whom the capacity for isolation, perception, and husbandry is undeveloped, or perhaps lost." "It would appear, in short, that the rudimentary grades of outdoor recreation consume their resource-base; the higher grades, at least to a degree, create their own satisfactions with little or no attrition of land or life. It is the expansion of transport without a corresponding growth of perception which threatens us with qualitative bankruptcy of the recreational process. Recreational development is a job, not of building roads into lovely country, but of building receptivity into the still unlovely human mind."

Conservation: Hawks

Luttringer, Leo A., Jr. Outlaws of the air--or are they?, National Sportsman (350 E. 22nd St., Chicago, Ill., 10 cents a copy), 79(5), May 1938, pp. 12-13, illus.

Summarized report on analyses of the contents of about 1,350 stomachs of hawks killed in Pennsylvania. The common species were represented by large enough numbers to give the findings significance. They agree with those of previous investigations and point only to the Cooper's and sharp-shinned hawks and the goshawk as subject to control. "The others are not only harmless under normal conditions, but very frequently are beneficial, particularly to farmers."

Such remarks on the part of the Biological Survey have been decried as propaganda, so it is hoped their strict confirmation by a State game commission will convince some doubters. The author states that there was evidence in a number of instances that prey had been wounded or crippled before being taken by the hawks. He notes efforts to curb hawk shooting as a sport, including the establishment of Hawk Mountain Sanctuary.

Conservation: International wildlife protection

Brouwer, G. A. The organisation of nature protection in the various countries, American Committee for International Wild Life Protection (185th St. and Southern Blvd., New York, N. Y.), 112 pp., January 1938.

Translation of the greater part of a book written 1926-29 and published in Dutch in 1931 with supplemental notes by the author that bring it more up-to-date. General discussion pertains to the motivation and significance of efforts toward nature protection, the urgency of such protection, the preservation of nature monuments (geological, botanical, zoological), and history of international nature protection. The bulk of the book is made up of accounts by countries (grouped according to continents) which note organizations concerned in conservation, name outstanding nature preserves, and cite pertinent literature. The importance of the bibliographic feature of the work is indicated by its extent--395 titles. North America is allotted 12 pages and 50 titles.

Conservation: Theory

Hagar, Joseph A. We need more realism in conservation, New England Museum of Natural History (Boston, Mass. Reprinted from January 1938 Bulletin of the Massachusetts Audubon Society, 66 Newbury St., Boston, 5 cents a copy), 87, April 1938, pp. 3-11, 1 fig.

Notes on the conflicting suggestions and claims that come to the official conservationist from persons considering only particular phases of the subject. Need of assembling and digesting all possible evidence as a basis for action and of an unemotional approach to conservation problems. The goal of Nature is preservation of species rather than of individuals. There being annual reproductive effort, and populations remaining about the same from year to year, many individuals must die. Some of the life hazards of birds are discussed and symbolized in a graph as barriers young must surmount to survive in the next adult generation. Individuals passing one barrier probably will be eliminated by another one. The most important hazard--or limiting factor--is the one that must be altered to cause actual increase or decrease of a species. There is a very narrow margin between a decreasing and an increasing species. A comparatively small increase in the rate of survival may mean a great increase in the total number of individuals, saving two out of a theoretical seasonal brood of ten young robins, for instance, would double the breeding population. A wider understanding of how Nature controls survival will advance conservation by focusing attention and effort on really vital matters. Breeding stocks must be maintained but surpluses will be eliminated, the exact time and method being of minor importance. [Comment: A desirable discussion which abides very well by underlying principles, but which is, perhaps, too indulgent as to man's activities. It has been a long time since man could be classed among

"natural" enemies of wildlife; his increase is not checked by diminution of his prey as is the case with natural enemies. The destructiveness of modern man in both direct and indirect ways is on too great a scale and only rarely is it confined to surpluses.]

Conservation: Water birds

Sprunt, Alexander, Jr. Beautiful birds of the southern Audubon sanctuaries, National Association of Audubon Societies (1775 Broadway, New York, N. Y., $1.00 a copy) Bul. 8, 39 pp., 11 colored plates, 2 half-tones, April 1938.

So far as this report is formal, it is an account of 16 species of the larger water birds (spoonbill, wood ibis, brown pelican, limpkin, 9 herons, and 3 true ibises) of the Gulf Coast, including for each the standard vernacular and scientific names (with derivations of the latter), local names, and statements of former and present ranges in the United States. Most of the text is informal and it conveys in excellent writing impressions of the author's field experiences that are vivid and refreshing. In some cases appearance, singly or in masses, is stressed, in others interesting habits, and for all, forthright conservation doctrine is earnestly presented.

Control: By electric fence

Nicholson, Arnold. Touch me not, Country Gentleman (Curtis Publishing Co., Philadelphia, Pa., 10 cents a copy), 107(11), Nov. 1937, pp. 20-21, 72-73, 2 cartoons.

Development of electrified-fence for controlling stock; how it works; cautions. Instances of its use in wildlife management include items referring to deer, elk, rabbits, coyotes, and feral cats.

Control: Ground squirrel in relation to quail

Horn, E. E. Some relationships of quail and ground squirrels in California, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(2), April 1938, pp. 58-60.

A few definite instances of ground squirrels molesting quail eggs and the apparent effect of eradication of these rodents in increasing the number of quail on a 15,000-acre stock range.

Cycles: Snowshoe hare

Green, Robert G., and Carl L. Larson. Shock disease and the snowshoe hare cycle, Science (The Science Press, Lancaster, Pa., 15 cents a copy), 87(2257), April 1, 1938, pp. 298-299.

An investigation carried on in Morrison County, Minnesota, since 1930 revealed that snowshoe hare populations decreased annually since 1933. Then there were about 478 hares to the square mile; in 1936 there were 164; and in

1937 "the numbers are so low that any enumeration will be difficult." Shock disease is now announced as the primary cause of the periodic decimation of the species. Its symptoms, lesions, and occurrence in the wild as well as the methods by which it was studied are briefly stated.

Destruction: Bob-white in winter

Wade, Douglas E. Death is upon them, Bird-Lore (National Association of Audubon Societies, 1775 Broadway, New York, N. Y., 30 cents a copy), 40(1), Jan.-Feb. 1938, pp. 7-10, 2 photos.

The subtitle, "The record of a weather-killed bob-white covey" abstracts the paper. It is a well-written account of the fate of a group of 32 birds wrought by simultaneous pressure from snow, cold, wind, and predators. Wisconsin.

Destruction: Waterfowl by drouth

Furniss, O. C. The 1937 waterfowl season in the Prince Albert district, central Saskatchewan, Wilson Bulletin (Sioux City, Iowa, 60 cents a copy), 50(1), March 1938, pp. 17-27, fig. 8, 7 tables.

Those inclined to think that the drouth cycle so disastrous to waterfowl is a thing of the past should give heed to this paper. In his opening sentence the author states that, "The 1937 waterfowl season in the Prince Albert district has been far less favorable than x x x former seasons." He adds that "a remarkable decline in the number of broods has taken place" and that "water levels reached their lowest x x x in the lifetime x x x of the oldest settlers." The dwindling water area, cover, and food are described, and counts of the breeding waterfowl population for 1935, '36, and '37 are given by species. The agents of nest destruction and the percentage of loss caused by each are recorded for the 3 years and statistics are given on hatch and on brood size. Those for brood size show an average decrease of 48.86 percent for 11 species in 1937 as contrasted to averages for 1934 and 1935. The author's summary is:

"A general summary reveals that until the late summer of 1936 conditions on the whole were very satisfactory when compared with other points, even though there has been a gradual lowering of water levels during the last fifteen years. The last two summers, exceedingly hot and dry, have dried up breeding sloughs and potholes, and any advantage that this district had when compared with other surrounding areas has almost disappeared. The decrease in waterfowl due to such predators as Crows and Marsh Hawks seems, as far as this area is concerned, to be greatly exaggerated. The oft quoted statement that as conditions in southern Saskatchewan and the northern parts of the United States became unsuitable for waterfowl they migrated and nested farther north appears unproved. Even when conditions here were nearly normal and conditions elsewhere much worse, there was no new influx of birds. The total number of young birds decreased this year (1937) by fifty per cent and the broods by almost the same figure. The decrease in the numbers of Lesser Scaups in the spring census is reflected again in the decrease in broods. The severe drought throughout the southern portions of the Prairie Provinces will not be off-set by the halting conservation policies at present in force and continued open seasons."

Diseases and Parasites: Bird malaria

Herman, Carlton M. Bird malaria and mosquito control, Bird-Banding (Charles B. Floyd, 210 South St., Boston, Mass., 75 cents a copy), 9(1), Jan. 1938, pp. 25-31.

Blood parasites causing malaria in birds belong to the genera Leucocytozoon, Haemoproteus, and Plasmodium. Only the last-named genus is shared by birds and man and there are no known species in common. Notes on diagnosis by blood smears, and the effects of the disease on birds. Transmission is by culicine mosquitos, not anopheline as for human malaria. There is something to be said for control measures (about the same as in the case of human malaria) for the sake of the birds themselves but the need is not at present known to be urgent. Control measures should be those least detrimental to wildlife. Bibliography of 9 titles.

Diseases and Parasites: Grouse

Boughton, Rex V. Endoparasitic infestations in grouse, their pathogenicity and correlation with meteoro-topographical conditions, University of Minnesota Agr. Expt. Sta. (St. Paul) Technical Bul. 121, 50 pp., 12 figs., 4 maps, 10 tables, August 1937.

Review of grouse cycles and postulated causes of mortality in Great Britain and in America. Results of study of 560 ruffed and 62 sharp-tailed grouse from Minnesota, South Dakota, Michigan, and Wisconsin. The methods of the study are described. There is a check-list of the parasitic forms revealed by the investigation--15 kinds--and a detailed account of each form, including synonymy, list of hosts, description, and distribution. Relative frequencies of occurrence of the parasites of the two species of grouse and also their seasonal and local incidence are tabulated and discussed. Pathogenicity of the parasites is considered and the general conclusion drawn that, as observed in this study, they did not appear to have materially affected the health of the birds. There is correlation between parasitism and environmental factors, especially precipitation, temperature, and soil texture. "The writer feels reasonably certain that the parasites found during this investigation were not responsible for the decline in the adult grouse population recorded in the state during the summer of 1933." The parasites, however, may kill off young birds in considerable numbers--a matter that needs further investigation. Bibliography of 55 titles.

Diseases and Parasites: Haemoproteus in black duck

Herman, Carlton M. Haemoproteus sp. from the common black duck, Anas rubripes tristis, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 24(1), Feb. 1938, pp. 53-56, 1 fig., 1 table.

Six out of 85 birds examined harbored low grade infections of this blood parasite. The record is first for the black duck and apparently also for any North American duck.

Diseases and Parasites: Screw-worm

Lindquist, Arthur W. Myiasis in wild animals in southwestern Texas, Journ. Economic Entomology (E. N. Cory, College Park, Md., 75 cents a copy), 30(5), Oct. 1937, pp. 735-740, 2 photos.

Abstracted by the following quotations: "The suggestion has been made that wild animals serving as hosts of Cochliomyia americana must be a constant source or reservoir of screwworm infestation for domestic animals, and aside from its being one of the worst problems with which ranchmen must contend, this pest is a factor in game conservation, because it takes a yearly toll of game animals."

"The cottontail, the jack rabbit, the opossum and the deer were found to harbor natural infestations of the screwworm, Cochliomyia americana. A total of 37 cases of myiasis in wild animals were studied. The fact that wildlife serves as a considerable source of infestation of the screwworm makes more difficult the control in livestock. Four per cent of the rabbits may carry infestations of C. americana. The predisposing causes which render animals subject to fly attack are rabbit bots, gunshot wounds, boils, disease, birth of young, injury by predators, fighting, and brush and wire cuts. Infested wild animals should be treated whenever practicable and maggot-infested carcasses promptly burned. Effective control of screwworms in livestock should result in fewer attacks on wildlife."

This article has a bibliography of 3 titles, and the immediately preceding paper in the same journal, devoted to myiasis of domestic animals, one of 12 references.

Diseases and Parasites: Silicon poisoning

Gray, Ernest. A curious case of supposed silicon poisoning in the swan, Nature (St. Martin's St., London, W.C. 2, England, 2 shillings a copy), 141(3560), Jan. 22, 1938, p. 163.

Fatal enteritis resulting from mechanical irritation caused by diatom shells and free silicon in a colloidal state present in an ornamental pond. After thorough cleaning of the pool, no further cases have been reported.

Ecology: Of burned areas

Reid, Elbert H., Leo A. Isaac, and G. D. Pickford. Plant succession on a cut-over, burned, and grazed Douglas fir area, Pacific Northwest Forest and Range Experiment Station (Portland, Oreg.) Forest Research Notes, 26, 8 pp., 1 fig., 2 tables, mimeographed, March 1938.

Authors' summary: "On a cut-over and burned Douglas fir area adjacent to the Wind River Experimental Forest, in southwestern Washington, observations as to plant succession were made during the period 1925-35, inclusive. Of the 85 plots on which observations were made, 20 had been burned over once, soon after logging, in 1919; 44 had been burned over soon after logging and after a

4-year interval had been reburned, in 1924; and 21 had been burned over once, 2 years after logging, in 1921. All the plots were subjected to grazing by sheep from 1925 to 1935. Grazing removed practically all the current growth of herbs and shrubs in 1925 and 1926; in later years, it was lighter and less prolonged. By 1935, the composition of the vegetation had so changed that grazing use was impractical.

"Weeds, principally fireweed, formed approximately 50 percent of the total plant cover in 1925, 1 to 5 years after burning. In 1935, weeds were but a minor part of the vegetation, having been replaced by bracken on the double burn and the delayed burn and by shrubs (blackberry, vine maple, etc.) on the single burn. Reduction of weeds took place almost entirely between 1925 and 1927, the period of heaviest grazing.

"Fire hazard was temporarily lowered by removal of the highly inflammable fireweed. On the double and delayed burns, the initial decrease in fire hazard was counteracted by the rapid and militant encroachment of bracken, which tends to become almost as inflammable as fireweed. On the single burn, substitution of shrubs for weeds has resulted in permanent reduction of fire hazard and considerably improved conditions for reforestation.

"Grazing probably hastened the reduction in density of weeds, which are eaten readily by sheep, and thus favored increase in bracken or shrubs.

"The data indicate that on cut-over Douglas fir lands similar to those used in this study and subjected to similar treatments the forage supply is ample during the 3 to 7 years following burning but dwindles thereafter, and that the potential duration of grazing on such lands is approximately 11 to 15 years."

"Forage supply" as used in the last paragraph means grasses, grass-like plants, and weeds. For application to wildlife, therefore, the findings are more significant for grazers than for browsers. The latter presumably would find conditions suitable for some years after the end of the best grazing period.

Ecology: Drought in relation to Hungarian partridge

Errington, Paul L., and F. N. Hamerstrom, Jr. Observations on the effect of a spring drought on reproduction in the Hungarian partridge, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 40(2), March-April 1938, pp. 71-73.

During a dry year, 1934, cover was much reduced and the proportion of nest destruction greatly increased. The causes of loss, however, were of the same nature as in other years. By re-nesting the partridges were able to rear a substantial number of young. The net losses may have been due to overpopulation rather than to drought. Pheasants laid eggs in 10 partridge nests; proportion of eggs 33:114. Predation was somewhat intensified in part apparently due to conditions associated with the drought. The general effect was of retardation and decreased productivity of the nesting season rather than of failure.

Ecology: Marsh in relation to waterfowl

Moffitt, James. Environmental factors affecting waterfowl in the Suisun area, California, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 40(2), March-April 1938, pp. 76-84.

Making of ponds by geese, and deepening of ponds with resultant changes in their ecology by waterfowl and carp. Destruction of duck ponds by cattle and hogs. Effects of burning, both good and bad. Control of water level in relation to waterfowl. Effects of baiting, dredging, flooding with salt water, and of mosquito control operations. Selective shooting in relation to waterfowl populations; history of change in abundance of the species. Effect of establishment of a refuge and comment on shooting regulations.

Ecology: Mosquito control operations

Bradbury, Harold M. Mosquito control operations on tide marshes in Massachusetts and their effect on shore birds and waterfowl, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(2), April 1938, pp. 49-52, 1 pl.

Partial restoration of drained marshes and the satisfactory results.

Ecology: Populations, fox squirrel

Baumgartner, Luther L. Population studies of the fox squirrel in Ohio, Ohio Wildlife Research Station (Ohio State University, Columbus) Release No. 70, 6 pp., 5 tables, mimeographed, Feb. 1938.

The fox squirrel is normally sedentary, the average distance from original point of capture for 141 retrapped animals being 149 yards, the greatest 375 yards. Pastured woodlots were less favorable for squirrels than unpastured, the average number of these rodents to the acre for the two types of habitat being 67.06 and 78.90, respectively. Winter feeding resulted in definite increase in the squirrel population. Of various methods of determining numbers, count of occupied leaf nests was best, apparently indicating, 1:1, the adult population. Sex ratios are given for the catches of squirrels by months; they vary but significance of the variation is unknown. The largest sample (954 in fall) had 55.5% males. Location of leaf nests is analyzed, the food habits are summarized, and weights and measurements of numerous specimens are given.

Ecology: Vegetation surveys

Stewart, George, and S. S. Hutchings. The point-observation-plot (square-foot-density) method of vegetation survey, Journ. Amer. Soc. of Agronomy (Geneva, N. Y., 60 cents a copy), 28(9), Sept. 1936, pp. 714-722, 1 fig.

Authors' summary:

"1. A new plot method of vegetation survey, known as the point-observation-plot method, has been devised by ecologists of the Intermountain

Forest and Range Experiment Station. This method has many distinct advantages over the ones formerly used. It has been nick-named the 'square-foot-density' method because data are recorded in that unit.

"2. The point-observation plot is usually 100 square feet in area, and for convenience is circular, though there is nothing essential in the shape of plot. The plot is marked off by drawing a circle around a central point which is located mechanically and in no way selected. Locating the plot mechanically without selection gives it randomness--an absolutely essential point in sampling an area.

"3. One man can take data on from 20 to 50 plots in a day, thereby making possible full replication of observations--a second absolutely essential quality to statistically reliable data. Plots are replicated 10 or 20 (or other multiples of 10) times to afford representativeness and replication. Such replication may be in a line transect of plots or in a network of plots more or less equi-distant in one or more directions.

"4. Separate workers can easily check with each other, i.e., one worker can duplicate another's data, if they practice together for a short time before beginning the survey.

"5. Comparisons can be readily made of 'protected' and heavily grazed areas, or of other range conditions.

"6. The method is suitable for depletion surveys, for forage inventories and for permanent plots; also for studies in range and pasture management, in erosion surveys, in agronomy, and in ecological observations.

"7. Furthermore, it makes possible a statistical analysis of the data by probable errors, by analysis of variance, or by the correlation method."

Economics: Mammal harvest in Ohio

Hicks, Lawrence E. The status of game mammals in Ohio, Ohio Wildlife Research Station (Ohio State University, Columbus), Release No. 73, 6 pp., 5 tables, mimeographed, Feb. 1938.

Synopsis of past and present occurrence of mammals in the State. The number of kinds now represented is 59, of which 8 are fur, and 3 game, species. The fur catch in two counties is analyzed and that for the State estimated (1,894,000 pelts). The abundance of 3 species of squirrels by ecological divisions of Ohio is tabulated and their importance as objects of sport commented on in text. The kill is estimated at 1,216,000 in 1936. The cottontail bag totals from 4 to 6 millions annually. Bibliography of 16 titles.

Education: 4-H Club work

Yeatter, Ralph E. Illinois conservation activities manual for 4-H Club members, Univ. of Illinois Extension Service in cooperation with Illinois State Natural History Survey (Urbana), 27 pp., 27 figs., Feb. 1938.

A handbook for the 4-H Club member interested in wildlife and its conservation. Sixty camp scholarships are to be given to those making the best record of accomplishment in this field. The pamphlet discusses the aims of wildlife management and gives recommendations, supplemented by illustrations, as to cover, aids to nesting, feed patches, winter food, and water. There is a section on fur-bearers and small game mammals, and others on predators, and on cover-mapping, and census-taking. Suggestions are made for seasonal conservation activities and there is a list of 16 publications for supplementary reading.

Education: Questions on conservation

Visher, Stephen S. Aids to the student of conservation. (John Wiley and Sons, Inc., New York, N. Y.), 32 pp., 1937.

Review questions and thought-provoking questions concerning the book, "Our natural resources and their conservation," edited by Parkins and Whitaker. (Abstracted in WILDLIFE REVIEW, No. 7, Dec. 1936, pp. 27-28.)

Food Habits: Birds vs. bot-flies

Hiller, Wm. Control of the nasal bot-fly, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 9(1), April 1938, p. 27.

Observations in Germany showed that flycatchers fed on adult bot-flies. Their numbers were increased by providing nest-boxes and in 3-4 years they apparently consumed so many of the insects that the number of infested deer very materially decreased. Suggestion that a similar process is possible in America; most of our flycatchers, however, do not nest in cavities so are not so readily encouraged.

Food Habits: Deer damage to jack pine

Anon. Deer damage to jack pine plantation in Minnesota, Lake States Forest Expt. Sta. (St. Paul, Minn.) Forest Research Digest, Spring 1938, pp. 4-5.

Count in a rabbit-proof enclosure showed 73% browsing attack by deer. On entirely unfenced areas it is more severe. The prohibitive cost of fencing is cited but lightly constructed electrified fence probably was not considered.

Food Habits: Grit consumption, pheasant

Dalke, Paul D. Amount of grit taken by pheasants in southern Michigan, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(2), April 1938, pp. 53-54, 2 tables.

The amount varies with age and according to season; size and quality of grits is discussed.

Food Habits: White-tailed deer

Anon. Food habits of Minnesota deer, Lake States Forest Expt. Sta. (St. Paul, Minn.) Technical Notes, No. 133, 1 p., Feb. 1938.

Examination of stomachs revealed 45 plant species eaten in fall and only 25 in winter. Conifers formed about one-fourth of the fall diet and three-fourths of that of winter. The species are named. General conclusions of the study are: "(1) That the winter carrying-capacity for deer in northeastern Minnesota is on the decline; (2) the browse species that form the greater part of the winter food are not of the greatest nutritional value; (3) many of the choice browse species are either characteristically rare or are becoming unattainable due to heavy browsing in previous years; (4) balsam fir, which may be good deer browse when eaten in moderate amounts in combination with more nutritious foods, is not capable of maintaining good health when eaten alone or in too great a proportion to other foods; (5) maple brush is the most generally available of the choice browse species in this area. Other desirable species may be abundant locally but are more spotty in their distribution; (6) the variation in the availability of certain browse species in different concentration areas indicates that management practices will have to be developed for and applied to rather limited areas."

Introductions: Chukar partridge

True, Gordon H., Jr. The chukar partridge of Asia, California Fish and Game (Ferry Bldg., San Francisco, Calif., 25 cents a copy), 23(3), July 1937, pp. 229-231, fig. 37.

The chukar (Alectoris graeca chukar) is one of 22 subspecies of a species that ranges from southern Europe to Arabia, India, and Mongolia. Birds introduced into California came from India. Description of the bird, its native habitat, and life history. Chukars have been liberated in 26 counties since 1932.

Life Histories: Ducks

Williams, Cecil S., and William H. Marshall. Duck nesting studies, Bear River Migratory Bird Refuge, Utah, 1937, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(2), April 1938, pp. 29-48, 6 figs., 4 pls., 10 tables.

Report on a study of 2,410 nests of nine species of wild ducks, including discussion of their distribution according to types of cover, location with reference to channels, and height above the soil. The closeness of approach of human observers permitted before the birds flushed from their nests is analyzed from 2,720 records. Size of clutches and fate of eggs also are discussed. The results are summarized in graphs and tables, the latter containing a wealth of detail.

Life Histories: Gray squirrel

Chapman, Floyd B. A summary of the Ohio gray squirrel investigation, Ohio Wildlife Research Station (Ohio State University, Columbus), Release No. 71, 7 pp., 4 tables, mimeographed, Feb. 1938.

Reports of progress in this investigation have been abstracted in WILDLIFE REVIEW Nos.: 4, June 1936, p. 15; 5, Sept. 1936, p. 19; and 13, March 1938, pp. 13-14; they dealt largely with regulated hunting and with information derived from interviewing hunters and inspecting their kill. The present paper summarizes data on: weights by age and sex classes, sex ratios by years, age classes, dens and leaf nests, courtship and mating, and parasites and diseases. The results of population studies indicate a cycle of about 5 years; estimates are given of the numbers of squirrels for different areas and years. Sixteen management recommendations are presented. Bibliography of 12 titles.

Life Histories: Red deer

Darling, F. Fraser. A herd of red deer (Oxford University Press, Oxford, England, 15 shillings a copy), 215 pp., 7 pls., 10 figs., 4 maps, 1937.

This book should be required reading in our wildlife management curricula at least until there is a work to equal it on some American animal. It is thorough and well written--in parts beautifully so. It shows the very great advantage of living with the objects of study--the indispensability of research in the field. It is evident that these things yielded the writer not only factual rewards but also the ultimate satisfaction all naturalists crave but few realize--of living in and as a part of nature. Among the red deer, he wrote "I have had the best of it--the love of them, neither wish nor necessity to do them harm, and a long time to watch through all seasons of the year." Technique and equipment are usefully described--the author found he could do stalking best when barefoot--the whole threshold of awareness was raised. Territory and population are treated under the divisions of winter, summer, and breeding territories; deer paths, wallows, and rubbing trees, and the social groups of hinds, stags, and harems. The social organization is matriarchal; hinds, not stags, are the leaders of family groups, of which the stags are only temporary members. Voice and play are described and general sociality discussed and to some extent compared with that of the roe deer and feral goats and sheep. There are chapters on movement as influenced by meteorological factors, insects, and food supply. Reproduction is treated in detail and the senses are discussed and appraised. Theoretical considerations receive attention throughout. There is a glossary of Gaelic place names, a succinctly annotated bibliography extending over 5-1/2 pages, and a good index.

Life Histories: Snowshoe hare

Criddle, Stuart. A study of the snowshoe rabbit, Canadian Field-Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 52(3), March 1938, pp. 31-40, 1 table, 1 graph.

The paper relates to Lepus a. phaeonotus, the common rabbit of deciduous and mixed forests of southern Manitoba. There are notes on pelage, measurements, and weights; on runways and the animal's work in clearing them, and on the use of holes; on sexual activities, the behavior of mothers and young, and on natural increase. There is nothing to indicate variation in birth rate in different phases of the cycle. A graph shows the course of a cycle, with peaks in 1922-23 and 1933-34. Food is discussed in some detail in separate sections for summer and winter. Migratory movements have been observed but normally the animals are localized and well-acquainted with their territories. Dusting and swimming, and diseases and predators, also are discussed.

Life Histories: Weights of birds

Nice, Margaret M. The biological significance of bird weights, Bird-Banding (Charles B. Floyd, 210 South St., Boston, Mass., 75 cents a copy), 9(1), Jan. 1938, pp. 1-11, 2 tables.

A report combining original and previously published data chiefly on small birds. Daily and seasonal fluctuations in weight are tabulated and discussed. Attention is given also to weight in relation to sex, age, and locality, and the weight of food in percentage of that of the bird. The author's summary is: "(1) Weight was found to fluctuate from 4.6 to 10.8 per cent throughout the day; (2) as a rule spring weight exceeded fall weight, while winter weight was highest of all; (3) weighings of White-throated Sparrows showed that in the mild fall of 1931 the birds averaged lighter than in the cold fall of 1932; that in 1931 birds that stayed from 5 to 26 days at Columbus failed to gain weight, and that later fall migrants were heavier than earlier migrants; (4) many species gain weight in winter, but some do not; (5) weight in the breeding season fluctuates considerably; the female increases markedly while laying eggs, and both parents lose weight while feeding young; (6) in many species the males are heavier than the females; in native sparrows captured in Columbus the female averaged from 88 to 95 per cent as heavy as the male, in Cowbirds 76 per cent; (7) immature birds often weigh less than adults; (8) more food is eaten in cold weather than in warm; (9) relatively more food is needed by a small bird than a large one."

There is a bibliography of 40 titles.

Management: Barberry eradication

Matheny, G. E. Plant blight campaigners find native barberry of little value to wildlife as food or cover, Virginia Wildlife (Blacksburg, Va.), 1(8), pp. 2, 6, 2 figs.

Because they are carriers of grain rusts, barberries are eradicated and it is estimated that more than 84 million of these plants have been destroyed in 9 counties of southwestern Virginia since April 1934. The justification named for removing the bushes is perhaps sufficient, but the statement that removal of so many plants is not detrimental to wildlife is subject to debate. It is said that the field workers report not once having seen game birds or animals using native barberry for food or cover--but could not this remark have

been made just as well of any of scores of other plants? The observers were not engaged primarily in wildlife studies and may have paid very little attention, indeed, to the subject. It is said that barberry bushes are so dense and thorny that they do not afford suitable cover for wildlife. The general impression is that these qualities are what make good cover. Hosley lists (Proc. N. A. Wildlife Conference, 1936, p. 579) barberry among the 45 more important northeastern woody plants used by wildlife, and notes the ruffed grouse, pheasant, cottontail, and song birds as its patrons. The Biological Survey has found barberries in the stomachs of 12 species of birds and the article here commented upon notes their value to small rodents. That essay further notes that barberry, being sought during periods of snow and ice, is at best a starvation ration. The principle on which this conclusion is based is not one to follow too implicitly, for late hanging fruits are most desirable in the wildlife menu and any ration is better than none in a starvation period. It would seem that some fruits improve in edibility through exposure to winter, and among them may be placed barberries, and fruits of holly, privet, and bush honeysuckle. All of these are sometimes devoured in quantity in late winter and early spring.

Management: Bobwhite in New Jersey

MacNamara, L. G. Bobwhite development of the Glassboro public shooting grounds, New Jersey Fish and Game Commission (Trenton), 10 pp., 4 maps, tables, mimeographed, April 1938.

The proportion of New Jersey available for hunting is limited but the Game Commission is acquiring and developing areas, particularly in the southern part of the State. The soils and natural vegetation of two of these are described. Development chiefly consisting of the clearing and planting of food patches is described and its cost in man-days recorded. The plants used were sorghums, millets, soybeans, cowpeas, buckwheat, vetch, rape, and flax. The quail spent much of their time in the food patches, in part apparently for their cover value. The tracts had some native quail and others were added. Hunting was prevented in 1936 but permitted in 1937. Counts before and after the shooting season revealed a reduction in the number of quail by about 53 percent.

Management: Farm game

Tubbs, Farley. Farm crops versus game, Michigan Conservation (State Dept. of Conservation, State Office Bldg., Lansing, Mich.), 7(7), March 1938, pp. 6-7, 3 photos.

Management of crops so as to favor wildlife by maintenance of cover; use of flushing bar in mowing; harvesting practices; fence row planting; caution in drainage. Part of the author's concluding remarks are: "It is suggested that farmers who wish to increase the game or wildlife on their lands do two things. (1) List all agricultural activities which tend to reduce the wildlife supply, and (2) substitute wherever possible economically and biologically sound agricultural practices which are conducive to a good supply of desirable wildlife species. x x x It is believed that the general adoption of sound cultural land

and stock management practices, which are favorable to wildlife, will produce more game than all the specific measures sportsmen and conservationists can entice the landowner to employ."

Management: Farmer-sportsman relationship

Anon. Fee shooting? Virginia Wildlife (Blacksburg, Va.), 1(4), Dec. 1937, p. 4.

Wildlife management is what is wanted, and that requires time, effort, and expenditure on the part of the farmer. Considering existing burdens, he can hardly be expected to do what is needed without compensation. The friendship approach to hunting privileges will leave many sportsmen unprovided for, because there are not enough farmers to go around.

Management: Feed patches

Allen, Durward L. Some observations on fall and winter food patches for birds in southern Michigan, Wilson Bulletin (Sioux City, Iowa, 60 cents a copy), 50(1), March 1938, pp. 42-46.

A good "food patch plant must provide an adequate and readily available supply of acceptable grain at the time when other foods are most scarce." The Williamston food patch mixture (for which formula is given) was sown in a variety of sites. Response of the plants and their utilization by birds are described. The plants grew well and were productive only on good soils and with ample rainfall. Most of the grain was consumed by song birds in fall. For that reason and because of lodging, the only seed available during periods of deep snow was hemp. Standing corn is the only dependable food supply through the winter. The value of weeds is discussed. There is a bibliography of 6 titles.

Management: Forest wildlife

Fitzgerald, O. A. Feud on the ranges, Country Gentleman (Curtis Publishing Co., Philadelphia, Pa., 5 cents a copy), 108(4), April 1938, pp. 15, 103-104, 1 photo.

Discussion of the charge that grazing by livestock is injurious to wildlife on the National Forests. The real limiting factor is winter range and it cannot be modified except by acquisition of lands outside the present boundaries of the Forests. It is not likely that sufficient winter range to match available summer range will ever be obtained so herds must be regulated. Keeping livestock away from spots frequented by recreationists might contribute to harmony, and grazing should be avoided in important upland game-bird range during the nesting season. The "biologist and game scientist," that is the wildlife manager, probably is in best position to mediate between the sportsmen and stockmen.

Management: Harvesting fox squirrels

Baumgartner, Luther L. A survey of the 1937 fox squirrel harvest in 27 Ohio counties, Ohio Wildlife Research Station (Ohio State University, Columbus), Release 69, 8 pp., 7 tables, mimeographed, Dec. 1937.

Author's synopsis: "Intent upon developing a more accurate method of invoicing the annual Ohio harvest of Fox Squirrels, a hunters' census was attempted during the 1937 squirrel hunting season. In 27 counties in the northern two-thirds of Ohio, 12 men cooperating interviewed about 500 squirrel hunters.

"From the census cards it was found that the average hunter spent 3.45 days hunting and bagged an average of 3.47 squirrels. For every 100 squirrels killed, 5.2 squirrels were crippled. In popularity the 12 gauge ranked first, the .22 caliber rifle second, with the 16 gauge, 20 gauge, and 410 gauge ranking third, fourth, and fifth, respectively. Slightly more than 50% of the hunters who were successful bagged from one to two squirrels, 25% from three to four, 15% from five to eight, and the remaining 10% killed from nine to twenty-two squirrels per hunter.

"About 97% of the hunters utilized less than two-thirds of the season, with but 3% using the entire season. A conservative calculation reveals that there were 51,000 squirrel hunters in the 27 counties sampled, of which 750 were gray squirrel hunters. These hunters killed approximately 174,000 squirrels. The sex ratio for all Fox Squirrels handled was reported as 55.66% males, 44.34% females."

Trial of a mail questionnaire resulted in failure.

Management: Miscellaneous

Anon. Wildlife Management in North Carolina (Division of Game and Inland Fisheries, Raleigh, N. Car.), 15 pp., 4 figs. (photos), March 1938.

This issue contains an article dealing with the farmer-sportsman relationship signed by Rupert E. West. Several notes relate to food habits: crow and quail eating poison ivy fruits; quail feeding heavily on pokeberries; wild turkey on flowering dogwood fruits; cottontail on Lespedeza sericea. Suggestions as to planting this legume. Cultivated species of Crotalaria are are not recommended for game plantings. The availability of old tobacco seed patches for wildlife feed patches is pointed out and recommendations made of what to plant.

Management: Miscellaneous

Anon. North Carolina Wildlife Conservation (Division of Game and Inland Fisheries, Raleigh, N. Car.), 2(4), April 1938, 14 pp., 2 photos, 1 fig.

Account of a large robin roost and efforts to protect the birds; droppings indicated feeding on dogwood and holly berries; illegality of molesting

fawns, cubs, and other immature wildlife; analyses of 23 quail crops from Randolph County, most important foods lespedeza and cowpea seeds; instances of the benefits of management for farm wildlife.

Management: Planning

Adams, Chas. C. The relation of the natural resources to regional and county planning, New York State Museum (Albany, N. Y.) Bul. 310, pp. 121-141, figs. 33-34, 45-47, 1937.

The section (pp. 129-131) devoted to plants and animals notes that it is difficult to make use of information which is not clearly expressed in maps. This indicates the need of much ecological surveying. Native vegetation often shows the best general use of land because it is the result of Nature's prolonged experiments with plant growth on the various sites. It is desirable to combine policies for plants and animals because they are so closely related. These natural resources require careful professional and technical study as a prerequisite to formulating and executing sound public policies for their care and utilization. Bibliography of 55 titles.

Management: Planting, black locust

Meginnis, H. G. Effect of depth of sowing on nursery yields of black locust, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 36(4), April 1938, pp. 411-416, 1 fig., 1 table.

Fuller account of the work reported under same title in January 1938 (abstract in WILDLIFE REVIEW, No. 11, Feb. 1938, p. 27). Seed should be covered 1/4 to 1/2 inch in a carefully prepared seedbed. Bibliography of 6 titles.

Management: Planting coverts

Anon. Covert planting for pheasants, I. C. I. Game Researches (Imperial Chemical Industries, Millbank, London, England) Advisory Leaflet 15, 12 pp., Jan. 1938.

Forestry characterized by small block cuttings and plantings and the leaving of marginal clear belts, is entirely compatible with satisfactory pheasant production. The suggestions given in this leaflet are for shooting estates and relate to the points of a good covert, construction of a covert, rides, flushing points, selection of trees, marginal cover of both trees and shrubs, nesting sites, and water. There are notes on protecting coverts against rabbits, in part by the use of plants not attractive to those animals. An appendix gives the numbers of trees required to plant an acre at various spacings and also planting distances for hedge plants.

Management: Planting, rooting of softwood cuttings

Ure, C. R. Preliminary tests with softwood cuttings of trees and shrubs in Alberta, Scientific Agriculture (1005 Confoderation Bldg., Ottawa, Canada), 17(12), Aug. 1937, pp. 720-726, 2 figs., 3 tables.

Report on trials of numerous species, a good proportion of which are of value to wildlife, giving results as to different media, bottom heat, place of basal cut, and stage of maturity in relation to rooting.

Management: Range

Mollin, F. E. If and when it rains, American National Live Stock Association (515 Cooper Bldg., Denver, Colo.), iv+60 pp., illus., 1938.

As the subtitle states, this pamphlet presents "The stockman's view of the range question." The message in general is that the drouth cycle has been made the pretext for exaggerated criticism of range use. There is a section (pp. 46-49) on wildlife which contends "that it is entirely practical to graze wild life and domestic live stock on the same areas in reasonable numbers," and that big game has been steadily increasing on National Forests despite grazing. The introduction points out that many ranchers have gone to great lengths to conserve wildlife and claims that "in many areas many varieties of game would today be extinct except for the protection provided by stockmen."

Management: Range bibliography

Renner, F. G., et al. A selected bibliography on management of western ranges, livestock, and wildlife, U. S. Dept. Agr. Miscellaneous Pub. (Supt. of Documents, Washington, D. C., 45 cents a copy)/ 468 pp., March 1938. 281,

The wildlife section is by no means restricted to western range entries and is the most extensive bibliography of American wildlife management yet published. There is an author index.

Management: Seed treatment

Hargrave, P. D. Seed germination of the saskatoon and pincherry, Scientific Agriculture (1005 Confederation Bldg., Ottawa, Canada), 17(12), Aug. 1937, pp. 736-739, 1 table.

Results from 3 types of after-ripening and the time required; temperatures at which after-ripening and germination occurred. Bibliography of 6 titles.

Management: Stocking chukar partridge

Bade, August. The chukar partridge in California, California Fish and Game (Ferry Bldg., San Francisco, Calif., 25 cents a copy), 23(3), July 1937, pp. 233-236, figs. 38-39.

Presents apparently the same material as the paper of same title abstracted in WILDLIFE REVIEW, No. 12, February 1938, p. 19.

Pollution: Destruction by oil

Aldrich, Elmer C. A recent oil-pollution and its effect on the water-birds of the San Francisco Bay area, Bird-Lore (National Association of Audubon Societies, 1775 Broadway, New York, N. Y., 30 cents a copy), 40(2), March-April 1938, pp. 110-114, 3 photos.

Wrecking of a tanker in the Golden Gate resulted in oil spreading far and wide--10-1/2 miles in one day. Lists of species of birds and number of individuals found on four measured lengths of beach--in all 269 to 5-1/2 miles.

Predators: Fire ant

Emlen, John T., Jr. Fire ants attacking California quail chicks, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 40(2), March-April 1938, pp. 85-86.

Record of a case of attack of Solenopsis xyloni on hatching eggs; nest protected by a ring of sodium fluoride and pyrethrum.

Propagation: Artificial incubation

Romanoff, Alexis L. Study of artificial incubation of game birds. III Effect of air movement on the incubation of pheasant and quail eggs. IV Interrelation of temperature, humidity, and air movement in the incubation of pheasant and quail eggs. Cornell University Agr. Expt. Sta. (Ithaca, N. Y.) Bul. 687, 30 pp., 11 figs., 11 tables, March 1938.

Careful research in methods of improving artificial incubation. Embryonic mortality, hatchability of eggs, and condition of hatched birds as affected by variations in temperature, humidity, and air movement are discussed in detail. Sectional summaries are:

"(1) In general, the pheasant eggs are less sensitive, both to a high rate of movement of air and to a great difference in temperature between the top and the bottom of the egg, than are the quail eggs; (2) both pheasant and quail eggs are sensitive to a high rate of movement of air during the latter part of incubation, and to a great difference in temperature between the top and the bottom of the egg during the early part of incubation; (3) the high rate of movement of air in the incubator up to 5 miles per hour is undesirable for pheasant eggs and disastrous for quail eggs during the latter part of incubation; (4) the great difference in temperature between the top and the bottom of the egg, up to 5° F. for every inch of elevation, is not desirable for pheasant eggs and is disastrous for quail eggs during the early part of incubation; (5) in the practice of artificial incubation of pheasant eggs, it would seem advantageous to incubate them in an agitated-air type of incubator and then transfer them for hatching into an incubator of the still-air type; (6) in the practice of artificial incubation of quail eggs, it would seem advantageous to both incubate and hatch them in a slow-agitated-air type of incubator."

"(1) There is a definite, yet specific-to-species, relationship among the three important physical factors of incubation--temperature, humidity, and

air movement; (2) there should be a proper adjustment of incubation conditions in respect to temperature and humidity according to the rate of air movement in the incubator; (3) the proper adjustment of temperature and humidity allows the more extensive use of agitated-air-type incubators for greater efficiency of operation in the hatching of pheasant and quail eggs; (4) pheasant eggs that have been incubated for the first 20 days in an agitated-air-type incubator may thereafter be hatched most successfully in a still-air-type incubator with a slightly lowered temperature (about 0.5° F. lower) and relative humidity (about 3 to 5 per cent lower) from the average conditions recommended for the type of incubator for continuous incubation and hatching; (5) quail eggs may be incubated and hatched most successfully in an agitated-air-type incubator, provided that with an increase of air movement there is a corresponding increase in both temperature (up to 0.25° F. higher) and relative humidity (about 2 to 3 per cent higher)."

Propagation: Artificial incubation

Romanoff, Alexis L., Gardiner Bump, and Earl Holm. Artificial incubation of some upland game birds' eggs, New York State Conservation Dept. (Albany) and New York State College of Agriculture (Ithaca) Joint Bul. 2, 44 pp., 2 pls., 3 figs., 4 graphs, 12 tables, Jan. 1938.

Report on thorough scientific investigation of the requirments for the most successful artificial incubation of the eggs of the ring-necked pheasant, bobwhite, and ruffed grouse. Some of the important subdivisions of the treatment are: nature and characteristics of birds' eggs, normal development of the embryo, temperature requirements, effects of air movement, interrelation of temperature, humidity, and air movement, and other factors of incubation. Specific recommendations for the management of incubators for each species are given in tabular form, and there are practical suggestions on selection, care, and shipment of eggs, choice, preparation, and management of incubators, handling of hatch, and computing weight loss of eggs. References are given to 9 pertinent papers by the authors and associates, and there is a 2-page general bibliography of works on the propagation of pheasants, grouse, and quail. General conclusions are:

"(1) The average normal temperature for the incubation of pheasant, grouse and quail eggs is (1) in an agitated air type incubator about 99-1/2° F and (2) in a still air type incubator from 101-1/2° to 103-1/2° for the pheasants and from 102° F to 104° F for grouse and quail eggs, depending upon the make of incubator; (2) at a constant humidity and air movement, pheasant eggs require higher temperature at the beginning and lower temperature at the end of incubation, perhaps as much as 2° F difference; (3) at a constant humidity and air movement, quail and grouse eggs require almost constant or even slightly raised temperature towards the end of incubation or about one-half degree F; (4) the average normal relative humidity for the incubation of pheasant, grouse and quail eggs, in either agitated air or still air type incubators is about 65 per cent; (5) pheasant eggs develop best if exposed to a higher humidity at the beginning and a lower one at the end of incubation. The reduction should be from about 70 per cent relative humidity to 60 per cent; (6) quail eggs require somewhat lower humidity at the beginning and higher at

the end of incubation, that is, rising from 60 per cent relative humidity to 70 per cent; (7) in practice it is usually best to incubate pheasant eggs in an agitated air type incubator then on the twentieth day to transfer for hatching into a still air type; (8) in practice it seems advantageous to incubate and to hatch quail eggs in a slow agitated air type incubator; (9) pheasant eggs that have been incubated for the first twenty days in an agitated air type incubator may thereafter be hatched most successfully in a still air type incubator with a slightly lower temperature (about one-half degree F) and lowered relative humidity (about 3-5%) from the average conditions recommended for the type of incubator where continuous hatching is practiced; (10) quail eggs may be incubated and hatched most successfully in an agitated air type incubator, provided that with an increase of air movement there is a corresponding increase in both temperature (up to one-quarter degree F) and relative humidity (about 2-3%); (11) the rate of exchange of oxygen and carbon dioxide is in proportion to the size of the embryo. Very little fresh air is needed at the beginning of incubation. However, it should be increased to an abundant supply at the time of hatching; (12) pheasant, grouse or quail eggs should be incubated preferably in their natural position, that is, horizontally though they can be hatched successfully in a vertical position--blunt end up; (13) turning from two to four times daily from the beginning up to the 20th day of incubation of pheasant, grouse and quail eggs should be sufficient."

Propagation: Cover in pens

Sodley, Henry. Cover for game birds in pens, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 8(4), April 1938, p. 4.

Sheds, brush piles, and growing plants, including woods, elephant grass, Cotoneaster, Lantana, and conifers.

Research: Feather-marking grouse

Edminster, Frank C. The marking of ruffed grouse for field identification, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(2), April 1938, pp. 55-57.

Reference to a variety of methods tested, of which only belling and feather-marking proved satisfactory and the former method to only a limited degree. The technics of dyeing white poultry retrices, fastening them to the stumps of tail feathers of the grouse, and grouping them in identifying combinations are described. There are notes also on marking by cutting tail feathers, and on the method of use of cat-bells.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-106. Report on extension work in wildlife conservation to December 1937, by I. T. Bode [abstracted by Lee K. Couch], 7 pp., March 1938.

General interest in wildlife conservation; needs for wildlife extension program; requirements for informational material; work accomplished and plans for 1938; suggestions for continuation program. Much the same material as in papers by Bode abstracted in WILDLIFE REVIEW, No. 12, Feb. 1938, p. 11, and No. 13, March 1938, pp. 12-13.

BS-107. Planning for wildlife management--an outline, 5 pp., March 1938.

Outline of things that should be considered while making a plan for wildlife management; survey of resources, including condition of existing habitat, present wildlife population, and limiting factors; management objectives, as to formulate and correlate plans for better land utilization, to insure permanence of basic resources, to produce optimum conditions for wildlife, to assure proper utilization of wildlife, to assure protection of personal and property rights, and to provide returns to the community and to individuals; and suggestions as to sources of supplemental information.

BS-108. History and significance of American wildlife, by H. P. Sheldon, 8 pp., March 1938.

Prepared for use in schools, this leaflet is organized under the following heads: original wealth in wildlife, abundance unimpaired by Indians, exploitation by white men, influence of wildlife on colonization and settlement, early traffic in wildlife and its products, exploitation era closing; wildlife management the remedy; restoration a land-use problem.

SPECIAL ARTICLE

Wildlife research programs (continued)

RESEARCH BY COLLEGES AND UNIVERSITIES

California, College of Agriculture (Davis).--"Biology of Valley Quail on farm lands. Seasonal cycle, nesting, food, cover requirements, causes of loss, effects of cultivation and other farm practices. Studies on University Farm at Davis by J. T. Emlen, Jr., two and one-third years.

"Valley Quail biology on foothill range lands (cooperative under U. S. Forest Service, California Forest & Range Experiment Station, U. S. Biological Survey, and Division of Zoology, U. C.). Details as in preceding but with

special attention to effect of wild rodents and grazing live stock. At San Joaquin Experimental Range about twenty-five miles east of Madera by Bon Glading, eight months.

"Birds in relation to almonds. Nature and extent of depredations by crows, California jays, California woodpeckers and flickers. Varietal preferences, means of overcoming difficulties. University Farm at Davis by J. T. Emlen, Jr., three summer seasons. Preliminary account in The Condor, Vol. 39, 1937, pp. 192-197.

"The muskrat as an alien in California and Europe. Economic status in areas where native, history of introductions and of spread, control measures and their success. T. I. Storer, Report in Journal of Mammalogy, 18(4), Nov. 1937, pp. 443-460.

"Age estimation in California deer. Examination and appraisal of criteria Limitations in use of antler characteristics; estimates of age based on tooth-eruption sequence and tooth wear as reflected in collections of deer killed by hunters during open season. T. I. Storer in cooperation with California Regional Office of U. S. Forest Service, two years.

"Biology of rodents and fleas in relation to plague (cooperative study with California State Board of Public Health, Hooper Foundation for Medical Research, and Divisions of Entomology and of Zoology, U. C.). Species involved, ecologic distribution, population, density before and after rodent control; density and species composition of flea fauna, Fletcher G. Palmer, four months." (Tracy I. Storer, Professor of Zoology, Sept. 22, 1937.)

Cornell University (Ithaca, N. Y.), Laboratory of Animal Nutrition.--"This laboratory concerns itself with problems of animal nutrition and physiology using the term animal in its broadest sense. From this standpoint we have carried on from time to time research with various species other than the domestic animals or man.

"In order to provide knowledge which would enable us to decrease the losses by starvation of deer in this state, we have carried on investigations of the nutritive requirements of this species and devised a supplementary food capable of being taken into the wild for consumption by deer during the winter months. The results of this study have found practical application in this state and elsewhere. So far as I know they represent the first metabolism studies of their kind which have been done with deer.

"We have also studied the digestibility of various foods for mink and made certain observations on their metabolism. We have shown that mink digest proteins and fats better than they assimilate carbohydrates; that they digest cooked carbohydrates better than uncooked; and, that the partial substitution of dried meat for fresh meat in the ration lowers its digestibility. We have also obtained a considerable number of data on the constituents of mink urine and the possible relation of diets to them. I have no report for distribution on this work but I expect a report will shortly be published in the American Fur Breeder.

"The few experiments which we have carried on have convinced us of the great need of the application to wild life research of the same fundamental techniques which have been employed in studying the nutritional physiology of man and the domestic animals. It has been our experience, however, that it is very difficult to interest in this kind of work the agencies who are primarily responsible for the support and policies with reference to the propagation and conservation of wild life." (L. A. Maynard, Professor of Animal Husbandry, Sept. 27, 1937.)

Idaho, University of (Moscow).--"The School of forestry at the University of Idaho began a modest research program on wildlife in the fall of 1936 when Dr. A. B. Hatch took over instruction in Game Management. As yet no projects have been completed.

"The studies so far are confined to introduced upland game birds in the farming country immediately surrounding Moscow and to the big game of the Selway-Bitterroot Primitive Area and vicinity.

"The bird studies seek to answer two questions: (1) the environmental (including hunting, both legal & illegal) factors which limit the increase of ring-neck pheasants and Hungarian partridges in the vicinity of Moscow, and (2) the role of these birds in destroying or disseminating weed seeds.

"Areas aggregating about 5,000 acres (on and off of game preserves) have been selected for intensive study. Cover maps were prepared and during five half-days of each week data are collected on the whole area on the life histories of all wildlife. Forty-five seniors in the School of Forestry are doing the field work. Additional information is being collected by Dr. Hatch and a graduate student on the birds seen and bagged by Moscow's five-hundred licensed hunters. By arrangement with the State Game Department, all birds released in the region are tagged.

"The weed seed study has yielded rather extensive data showing that with one exception all weed seeds of the region are destroyed in passing through pheasants. Because of conflicting evidence obtained elsewhere, the study is being continued, only birds being used which have been trapped from the wild and these retained in captivity no longer than the duration of one forced feeding experiment.

"The big game studies are being carried out jointly with the U. S. Forest Service. They include winter game census studies and experiments on improving the badly overgrazed winter range of elk and deer in the Selway. Some thirty-three acres of this range has been fertilized with various quantities of nitrogen (see Mitchell, H. D., and Hosley, N. W., 1936, Differential browsing by deer on plots variously fertilized. Black Rock Forest Papers 1 (No. 5): 24-27) and the growth, sugar and nitrogen content and palatability to game of the browse on these plots are being investigated." (D. S. Jeffers, Dean, School of Forestry, Nov. 12, 1937.)

Michigan State College of Agriculture and Applied Science (East Lansing).--"Associate Professor J. W. Stack and his advanced students have for years been cooperating with the Biological Survey by banding song birds on and near the

Campus of Michigan State College. Thirteen or fourteen thousand individuals have been banded and the results reported to the Biological Survey.

"Mr. Durward L. Allen has just completed a comprehensive ecological study of the W. K. Kellogg farm, forestry, and bird sanctuary area near Battle Creek. The interrelationships of the mammalian and avian faunae were quite extensively investigated in this study which extended over a couple of years. The results are to be published before long.

"Mr. Carl Gower has just finished an extensive investigation of the animal parasites in ducks at the W. K. Kellogg Bird Sanctuary. We expect that his results will be published as a bulletin by the Michigan Agricultural Experiment Station.

"George B. Becker, who is now an employee of the Federal Soil Conservation Service in North Carolina, carried out a study some years ago on weights and temperatures in song birds. Professor Stack intends to publish the results soon.

"We have been experimenting, in a more or less hit and miss fashion, on breeding and raising beavers in small enclosures. We have succeeded in getting one pair to breed several times, but we are not satisfied that we have solved the main problems of beaver culture under these conditions. We intend to pursue the matter further.

"Other projects have occurred to us, or have been attacked with varying degrees of success. The one thing I have attempted to study is the inheritance of grey versus black in fox squirrels, but after several years I succeeded in getting only one pair to breed in captivity. Mr. Ostenson has been interested in the control of mice which in winters of deep snow eat the bark on fruit trees." (H. R. Hunt, Head of the Department of Zoology, Sept. 24, 1937.)

Michigan, University of (Ann Arbor).--

Department of Zoology

A. E. Woodhead and graduate students
The life history of Dioctophyme renale, the giant kidney worm of mink.

E. L. Chenlun
The life history of Leuchloridium parasites of marsh birds.

Lowell Woodbury
A statistical study of Clinostomum and other parasites as affecting the growth of fishes.

Division of Mammals, Museum of Zoology, and
Laboratory of Vertebrate Genetics

Lee R. Dice
Experiments on methods for taking censuses of small mammals; relation of geographic races and local varieties to environmental conditions; inherited variations in wild rodents; fertility relations of races and species; classification of biotic provinces and districts of North America.

W. H. Burt
Studies of home ranges and individual wanderings of small mammals; rate of multiplication and population densities of small mammals in southern Michigan.

A. J. Nicholson
Homes of small mammals in southern Michigan; life history of the fox squirrel in southern Michigan.

W. Frank Blair
Ecological communities western Oklahoma and of the Davis Mountain region of Texas.

Don Hayne
Metabolic rates of native small mammals.

School of Forestry and Conservation

E. C. O'Roke
Progressive loss of the protozoan parasite of ducks (Leucocytozoon anatis) as normal recovery of the host takes place; lungworms in deer. Several lines of investigation dealing with distribution, pathology, ecology, and life history; Fasciolopsis magnum, the large liver fluke of deer, in a herd of deer in a fenced inclosure; recovery of Scotch pine following rabbit injuries, continued studies now in the seventh year; overlapping interests of wildlife and domestic animals, part of a comprehensive study dealing with land utilization in Cheboygan County, Michigan.

H. M. Wight
An inventory of the wildlife resources of Washtenaw County, Michigan; the effect of certain forestry practices on wildlife (in cooperation with the U. S. Forest Service on the Huron National Forest); a method of evaluating a forest wildlife environment quantitatively.

S. A. Graham
Development of a research and demonstration area to cover the major environments in a typical mixed forest in the Lake States region.

Neil Hosley
An investigation of the woody plants as wildlife management materials.

W. H. Long
A quantitative study of the effects of wildlife management practices on song birds; the physiology of game birds, laboratory metabolism studies made by means of precision apparatus with certain factors controlled and measurable; a comparative study of the metabolism and activity of different strains of wild turkeys (in cooperation with the Pennsylvania State Game Commission).

Henry Mosby
The basic factors underlying the past and present distribution of the wild turkey; factors affecting the distribution and abundance of the wild turkey in Virginia.

O. H. Clark
The correlation of wildlife management and other land uses. An area study based upon field work in Emmet County, Michigan.

F. C. Goble
The normal histology of the white-tailed deer; the histopathology of the white-tailed deer, with particular reference to lungworm infections.

J. P. Johnston
The distribution of livestock-poisoning plants in Michigan (later studies are contemplated to ascertain whether any of these plants are poisonous to deer).

A. B. Hovey
A method of evaluating waterfowl environment in southern Michigan. A comparative study of several lakes.

C. E. MacGregor
A game management plan for Northville Township, Washtenaw County, Michigan.

C. S. Miller
Factors affecting the distribution and abundance of ruffed grouse in southern Michigan.

B. A. Bateman
Coordinating wildlife management with timber management on southern forests. (Timber management plans have already been developed for the areas to be considered in this study.)

George Kelker
Wildlife population studies, emphasizing the use of mathematics.

Wm. Marshall
Population studies of fur-bearing animals.

W. T. Early
The carrying capacity of deer yards.

Samuel D. Knox
The conservation of birds of prey.

Irwin Sturgis
A life history study of the mourning dove; a key for identifying bird feathers.

H. A. Mathiak
Development of a key for identifying hair and fur.
(S. T. Dana, Dean, School of Forestry and Conservation, Oct. 8, 1937.)

Wisconsin, University of (Madison).--

Hungarian Partridge Study. A. S. Hawkins. Nesting, population levels, feeding. Favillo Grove Area.

Prairie Chicken Study. F. N. Hamerstrom, Jr. Banding. Physiology of budding. (Just starting; resumption of Schmidt study.)

Pheasant Movement Study. A. S. Hawkins (for 1937-38). Behavior of marked winter releases of trapped birds (1936-37). Behavior of marked resident birds (1937-38).

Foodpatch Study. Lyle Sowls. Offering various standing grains and following selection by observation and stomach analysis.

Feeding Study. A. S. Hawkins. Same, only shelled grains in trays and hoppers. (Completed.)

Horned Owl Pressure on Game Birds. Frances Hamerstrom. Pellet analysis and correlation with environment.

Spread of Hungarian Partridge in Wisconsin. Aldo Leopold. Historical.

Life History and Management of Desmodium. Lyle Sowls. Culture. Insect enemies. Yields per acre. Effects on density of grazing, burning, etc.

Ecological History of Faville Grove. A. S. Hawkins. History of local wildlife in terms of agricultural practice and ecological conditions.

Restoration of a Woodlot for Ruffed Grouse. Douglas E. Wade. Rebuilding a grazed-out woodlot by planting, then restocking.

Food and Cover Handbook. Douglas E. Wade. Compiling in popular form all available research findings on farm wildlife applicable to Wisconsin."
(Aldo Leopold, Professor of Game Management, Sept. 17, 1937.)

RESEARCH BY MISCELLANEOUS ESTABLISHMENTS

Cooperative Quail Study Association (Thomasville, Ga.).--

A. Food and Cover Experiments.
   1. Correlation of upland game management with agricultural and forestry practices. Native and exotic vegetations, and summer cover crops and winter cover crops that may have value to game.
   2. Controlled burning.
   3. Volunteer vegetations.
   4. New and desirable game and wildlife feeds, especially early spring seeders, of which we have a great need. Fall seeders. Experimental dove field plantings.

During the past year we have tested 106 species of plants at Sherwood Plantation. Those already known to be of value were planted in duplication to determine the best fertilization for practical use. (These studies are in cooperation with State and Federal Experiment Stations.)

B. Predation Studies. This year largely confined to relationship of native mammals to quail.
   1. Fox life history study with special emphasis on food habits during the breeding season of upland game, on ground where the game popula-

tions are roughly known. This study now going into third year.
2. Bobcat, skunk, opossum, and raccoon food habit studies. (In cooperation, especially with U. S. Bureau of Biological Survey.)
3. Cotton rat life history study.
4. Deer repellent study--electric fence, etc.

C. Comparison of Game Management Practices in Different Sections and on Different Soils of Southeast.

This consists of the gathering of information in the course of practical inspections on representative preserves in the Carolinas, Georgia, and Florida largely. Statistics as to kill and sex ratios are a byproduct of this work.

(Herbert L. Stoddard, Director, Cooperative Quail Study Association, Sept. 23, 1937.)

Roosevelt Wildlife Forest Experiment Station (Syracuse, N. Y.).--"The researches most recently completed by the Roosevelt Wildlife Forest Experiment Station are described in the latest two publications of the Station:

"Roosevelt Wildlife Bulletin, Vol. 6, no. 4. Preliminary reconnaissance of the land vertebrates of the Archer and Anna Huntington Wild Life Forest Station, by Charles E. Johnson; Preliminary reconnaissance of the waters of the Archer and Anna Huntington Wild Life Forest Station and their fish inhabitants, by Wilford A. Dence; published, January, 1937. This is an inventory of the vertebrate species occurring on the Huntington Forest, a 13,000-acre tract of typical Adirondack forest situated near Newcomb, New York, and deeded to Syracuse University in trust for the New York State College of Forestry, by Archer M. and Anna H. Huntington. It is to be used 'for investigation, experiment and research in relation to the habits, life histories, methods of propagation and management of fish, birds, game, food, and fur animals and as a forest for wild life.'

"Roosevelt Wildlife Bulletin, Vol. 7, no. 1. Effect of deer browsing on certain western Adirondack forest types, by John Pearce; published October, 1937. This deals with the measurement of the extent and effect of deer browsing on certain types of Adirondack forests, intended primarily to determine the effect of browsing on forest types and forest succession.

"Two other Station projects are completed and the results are being prepared for publication at this time. These are:

"Birds of the Northern Boundary of New York State, by A. Sidney Hyde. This is a comprehensive ornithological and ecological survey of the northern boundary of New York State, including work on various ecological areas, breeding activities, migrations, conservation, and other pertinent questions.

"Birds of the Catskill Mountains, by Charles J. Spiker. An ornithological survey of the Catskill Mountains.

"A current project on which much work has been accomplished is:

"Studies on small mammals by M. T. Townsend. This is a continuation of an extended investigation, the first part of which was published in the Roosevelt Wildlife Annals, Vol. 4, no. 1. Studies on some small mammals of central New York; December, 1935, by M. T. Townsend. The present study deals with populations, distribution, movements, local range, ecological relation, and experiments in methods of study of small mammals of various ecological associations and habitats.

"The Station's plans for research in the immediate future center very largely around the Huntington Forest. Two general types of research are planned

A. Investigations of: population fluctuations; seasonal distribution; seasonal, annual, and life-time ranges (cruising radius); rate of spread; preferences in the matters of foods and coverts according to species, sexes, age group, seasons, and activities; and certain phases of life histories of the species concerned.

B. Investigations of: the effects on wildlife of various kinds of forest management and silvicultural practices; and the response of wildlife to various wildlife management practices.

"The investigations will be of an intensive nature on a limited area rather than extensive and on scattered areas; they will attempt to correlate wildlife activities, reactions, and responses to the whole environment (undisturbed on that portion of the forest retained as a check area) and to controlled changes of the environment (on that portion of the forest where logging, silviculture, and planting will be practiced). The primary aim is to determine if possible how sound wildlife conservation through 'management' can be practiced in connection with sound timber management and to demonstrate the economic and biological feasibility of a sound forest management program that takes account of all the forest products." (Ralph T. King, Director, Oct. 11, 1937.)

NOTES AND NEWS

The National Park Service, Department of the Interior, Washington, D. C., has issued (mimeographed) an extensive Check-List of the Birds of the National Parks. The complete work is available in limited quantity from the address given and separates of the sections relating to the different Parks are in the hands of the administrators of those reservations. The lists include records by Park naturalists and from the literature and there is a bibliography of papers cited for each chapter. The publication is preliminary in character and was planned to elicit amplifying data from all having information on birds of the Parks. The volume is dated December 1937 but was distributed in April 1938 and is inscribed "not for publication".

The Iowa Agricultural Experiment Station (Ames) has published a booklet by Thomas G. Scott and George O. Hendrickson, entitled "Nesting birds of Iowa" (64 pp., illus., March 1938). It contains sections on attracting birds and on bird adaptations, illustrated, and accounts of 50 species, each of which includes a brief description, notes on habits, and competent line drawings of a pair or family group by Sid Horn. Mention is made of 15 other species and a short list of available publications is given.

A list of 12 species of birds seen feeding on mulberries (Morus alba) at Wood's Hole, Mass., by C. C. Purdum and F. P. Browne was printed in The Oologist, 19(2), Feb. 1902, p. 24. It contains the names of 3 species not included in the list of 63 given in WILDLIFE REVIEW, No. 10, Oct. 1937, p. 24, namely, the black and white, and black-throated green, warblers, and the ruby-throated hummingbird. The last named bird may feed on mulberries but rather precise observations should be made to settle the point. There might be other things about a fruiting mulberry tree attractive to hummingbirds--insect-secreted honeydew for instance.

Imperial Chemical Industries, Millbank, London, England, has issued another catalog of its publications on game researches, listing 14 Advisory Leaflets and 5 other booklets. Advisory Leaflet No. 15 is abstracted in the present issue of WILDLIFE REVIEW. The subjects of 7 proposed leaflets in this series also are given in the list cited. Announcement is made that the corporation has decided to continue game research for a further period (apparently of 5 years) as well as support of, and cooperation with, the Bureau of Animal Population. The cooperative program is outlined. It includes maintenance of a field station at which nutritional requirements and means of protecting game bird populations against diseases will be the principal objects of research.

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